

Effect of net wrapping and processor of fiber in the Alfalfa's hay (*Medicago sativa* L.)

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Introduction The round balers came to Argentina in 1984 and revolutionized the way of conserving fodder, because it allowed machining tasks in the making of hay. In the last five years the trend in hay making in Argentina, has shifted to the use of mega balers (750 - 1000 kg / bale). Because of this round balers have had to evolve to increase efficiency in order to lower operating costs and increase the quality of hay made, which added to the lower cost of acquisition they own, are positioned as an implement of great adoption in Argentina, where the use is primarily domestic, unlike mega balers whose use is 95% commercial (mega bale sales). The industry has incorporated to the most advanced models of round balers, tools such as net wrapping and processor of fiber. In this study we evaluated the influence of these technologies on the quality of hay from field work conditions.

Materials and methods The experience was held on April 6, 2011 in the agricultural experimental station INTA Manfredi, Cordoba Province, Argentina. The trial was conducted in a batch of Alfalfa (*Medicago sativa* L.), implemented in the field number 5 of that establishment. The climatic conditions prevailing at the time of the trial allowed the rows of Alfalfa (*Medicago sativa* L.), take 5 days after cutting to reach proper humidity conditions for haymaking. Three treatments were applied: Treatment 1: round baler with compacted drum system, net wrapping and fiber processing system; Treatment 2: round baler with compacted drum system, net wrapping and fiber processing system disconnected; Treatment 3: round baler compacting system with straps, wire wrapping without fiber processor. Bales were made under the three treatments, by choosing the position of each treatment in a completely randomized way in the field. The material losses of the collector and the mechanisms of the machine were sampled by a tarp placed underneath each machine at work. This canvas also caught the portion of foreign material lifted by the round baler in each treatment. Each sample extracted from the processing rolls was divided into two equal parts. One sample was used in the Penn State particle separator, to evaluate the proportions of the various fractions of particles and analyze hay achieved throughout the fractions above 19 mm. The other part of the samples were sent to the laboratory of Animal Production EEA INTA Manfredi, where it was performed quality analysis: % CP, % NDF, % ADF, % digestibility, ME and % Ash.

Results

Table 1 Average characteristics of Alfalfa round bales (*Medicago sativa* L.) obtained from the different treatments of the test and the material collected as waste along the round bales making.

| Treatment | Treatment 1 | Treatment 2 | Treatment 3 |
|---|-------------|-------------|-------------|
| Bale weight (kg) | 404 | 358 | 747 |
| Bale density (kg/m ³) | 180 | 160 | 241 |
| Total weight lost (kg) | 14.7 | 6.9 | 22.8 |
| Dust fraction of losses (kg)* | 5.6 | 3.3 | 9.7 |
| Crop fraction of losses (kg) | 9.1 | 3.6 | 13.1 |
| Crop fraction of losses (%) | 2.3 | 1 | 1.7 |
| Crop fraction of losses (% crude protein) | 23.9 | 24.0 | 25.9 |

* This data record ash values higher than 80% in all cases.

Table 2 Results of Penn State particle separator after the process of processing round bales of Alfalfa (*Medicago sativa* L.) in a vertical mixer.

| Treatment | Treatment 1 | Treatment 2 | Treatment 3 |
|----------------------------|-------------|-------------|-------------|
| % Portion > 19 mm | 58 | 61.5 | 73 |
| % Portion > 8mm | 27.5 | 21.5 | 14 |
| % Blind tray | 14.5 | 17 | 13 |
| Average fiber length (cm.) | 10-20 | 30-40 | 40-60 |

Conclusions Treatment using configuration 1 achieves a high efficiency hay utilization in ruminants, because it can obtain an average fiber length between 10 and 15 cm, favoring the fiber feed rate, and ensuring a proper effective salivation. In the case of bales obtained in treatments 2 and 3, the length of the fibers is between 40 to 60 cm, this reduces the rate of intake, because it needs more time chewing. In treatments 1 and 2, vegetable portion losses were not significant due to the few number of turns required to wrap the plant material with net. If using bales obtained from treatment 1, is reduced to one third work stage shredding and chipping of the bales by the vertical mixers. The efficiency of the mixer wagon increases by 300% when the same is loaded with hay made with fiber processor.